A SYSTEM AND METHOD FOR COLLECTING, STORING, MANAGING AND PROVIDING CATEGORIZED INFORMATION RELATED TO A DOCUMENT OBJECT

1 **TECHNICAL FIELD**

2   The technical field is relating documents on computer networks and storing,

3 indexing and presenting those relationships to network users.

4 **BACKGROUND**

5   Networks connecting many computers offer users access to a wide variety of

6 information. Computers are exceptional devices for storing, sorting and relating large

7 amounts of information. Information is stored on computers and networked computing

8 and storage devices as documents or objects, together referred to as document objects.

9 Such document objects may contain any form of information, from text documents and

10 articles, financial data, statistical information, electronic mail, images and photos, music,

11 animation, and even motion pictures.

12   The Internet, as a network of interconnected networks, offers users access to an

13 even broader collection of information - the Worldwide Web (the "Web"). On the Web,

14 publishers offer information for educational, recreational, and commercial purposes. The

15 Internet, and it's predominant Web form, is organized and accessed by assigning

16 document objects an address, or Uniform Resource Locater ("URL"). These URLs define

17 the transfer protocol for and location of each individual document object on the Internet,

18 or other network, including the Internetworking Protocol ("IP") address of the host

19 computer system of the document object.

20   Users accessing computer networks and the Internet are generally required to

21 perform their own searches across the networks for the information, stored as document

22 objects, that they desire or need. As the amount of information available on computer

23 networks, and on the Internet in particular, grows exponentially, existing search and

24 information location techniques become increasingly less effective. Existing Internet

25 search techniques often yield too many seemingly related references which are not, in

26 fact, truly useful to the user. The usefulness of traditional Internet search and indexing

27 systems is actually decreasing as the number of documents on the Internet explodes.

28   Existing search, categorization, and retrieval techniques for document objects

29 stored on computer networks, while generally executed at the high speeds of modern

30 computer systems, are increasingly imprecise and often much too broad, as well as time

31 and labor intensive, owing to the explosion of information being added to those networks.

1   A need exists to enhance the network user's information browsing experience. A

2   need exists to provide network users with information relevant to the individual document

3   object they are accessing and provide that information in a context of value to them by

4   relating the document object they are accessing to link references to other document

5   objects within a specific context. Such other document objects may or may not be offered

6   by the publisher of the document object currently accessed. A need exists to provide

7   network users with information relevant to the specific information the user may be

8   searching for and relevant to the user's immediate personal, professional, geographic and

9   other interests.

10   A need exists for entities or groups to be able to communicate information to their

11   employees or members as those employees or members access document objects on a

12   network, and to enable those employees or members to view content deemed important to

13   the entities or groups. A need further exists for publishers of content on the Internet to be

14   able to personalize content presented to Internet users without requiring the establishment

15   of a personal relationship between the user and the content publisher. A need exists to

16   enable the collection of the search experiences of a group of users and share that

17   experience with other users of networked information devices.

18   **SUMMARY**

19   The systems, apparatus and methods of the present invention (hereinafter

20   "Linkspace") incorporate and provide many improvements on existing methods for

21   publishing, distributing, relating and searching document objects on computer networks,

22   including the Internet.

23   Linkspace operates to provide many beneficial improvements in searching,

24   identifying and publishing information over computer networks.

25   Linkspace permits a user of a computer network or the Internet to establish

26   relationships between document objects located on the network or the Internet. Those

27   relationships may comprise link relationships and link references and are maintained by

28   Linkspace in one or more link directories. The contents of link directories may be

29   organized, categorized, sorted and filtered in groupings based on various criteria relating

30   to, among other things, user interests and attributes, the types of document objects and the

31   nature of the content of those document objects. Linkspace allows a network user to be

32   presented with a selection of links to document objects related to the document object the

33   user is currently accessing based upon the URL of the current document object, and link

1 relationships created by the user and other users of the network stored in the link

2 directories.

3   When a network user equipped with Linkspace identifies and locates a first

4 document object on the network that is of interest to her, she may initiate one method of

5 the present invention to mark the location, through its URL, as a start point of a link

6 relationship. When she accesses a second document object on the network that she

7 considers relevant to the first document object, she initiates another step of one method of

8 the invention to mark the second document object as an end point of the link relationship.

9 Upon marking the second document object as the end point, the link relationship is

10 created and stored on a link directory selected to store similar link relationships. When a

11 second network user equipped with Linkspace, and with access to the link directory,

12 accesses the first document object, he is then presented with a link to the second

13 document object as a relevant document object that may be of interest to him. Likewise,

14 if the second network user accesses the second document object, he may then be

15 presented with a link to the first document object as a relevant document object that may

16 be of interest to him.

17   Linkspace consists primarily of a system and method for creating and publishing

18 link relationships, a system and method for storing and managing link relationships in

19 link directories, and a system and method for presenting a network user with links related

20 by link relationships to the document object the user is currently accessing.

21   In one respect what is described is a method for enabling users of a network to

22 create, store, and provide access to relationships between document objects stored on the

23 network. The method may include the steps for allowing a user of the network to create a

24 link relationship between a first document object and a second document object; for

25 storing the link relationship in one or more link directories; and for providing all users of

26 the network access to the link relationships stored in the one or more link directories

27 based upon the document object currently accessed by the users.

28   In another respect what is described is a system for establishing and providing

29 access to relationships between document objects stored on a network wherein the

30 relationship between a first document object and a second document object may be

31 created by an individual user of the network and provided to other users of the network.

32 The system may include one or more client devices that access document objects stored

33 on the network and create link relationships between a first document object and a second

34 document object; and one or more servers that store and filter the link relationships

1 created by the client devices and transmit one or more link relationships and link

2 references to the client devices.

3 In yet another respect, what is described is a computer readable medium on which

4 is embedded a program. The embedded program comprises modules that execute the

5 above method.

6 Those skilled in the art will appreciate these and other advantages and benefits of

7 various embodiments of the invention upon reading the following detailed description of

8 a preferred embodiment with reference to the below-listed drawings.

9 **DESCRIPTION OF THE DRAWINGS**

10 The detailed description will refer to the following drawings, wherein like

11 numerals refer to like elements, and wherein:

12 Figure 1 is a diagram showing a system according to one embodiment of the

13 invention;

14 Figure 2 is a diagram showing a client device which is Linkspace-enabled and its

15 interaction with other hardware and software;

16 Figure 3a is a diagram showing the components of a server which is Linkspace-

17 enabled and its interaction with other hardware and software;

18 Figure 3b is a diagram showing more detail of one embodiment of a user data

19 store from Figure 3a;

20 Figure 4a is a diagram illustrating one embodiment of a link directory according

21 to one embodiment of the invention;

22 Figure 4b is a diagram illustrating another embodiment of a link directory

23 according to one embodiment of the invention;

24 Figure 5 is a diagram showing one embodiment of the invention implemented on

25 public, private or closed computer networks;

26 Figure 6 is a flowchart illustrating a method according to one embodiment of the

27 invention;

28 Figure 7 is a flowchart illustrating a method for identifying link relationships

29 between document objects according to one embodiment of the invention; and

30 Figure 8 is a flowchart illustrating a method for publishing link relationships

31 between document objects according to one embodiment of the invention.

32 Figure 9 is one example screen view of a user interface for a relate links dialog

33 box according to one embodiment of the invention.

1   Figure 10 is an example of a screen view for a client user interface according to

2   one embodiment of the invention..

3   **DETAILED DESCRIPTION**

4   Figure 1 shows one embodiment of a system 100 for collecting, storing, managing

5   and providing to network users categorized information related to an open document

6   object. A document object may contain any form of information, including text

7   documents and articles, financial data, statistical information, electronic mail, images and

8   photos, music, voice data, animation, and even motion pictures. The system 100 includes

9   a network 10, such as the Internet or other network of interconnected computers or a

10   combination of networks and the Internet; one or more Linkspace-enabled client devices

11   20; one or more Linkspace-enabled servers 30, one or more first document objects 40;

12   one or more second document objects 50; one or more link references 42 and 52,

13   corresponding to the first document objects 40 and the second document objects 50

14   respectively; and one or more link relationships 45. The system 100 may also include one

15   or more links 41 and 51 pointing to the first document objects 40 and second document

16   objects 50 respectively. The client devices 20, as well as the server 30, are preferably

17   Linkspace-enabled. The client device 20 may comprise a computer or other digital

18   information device running software enabled by the present invention to create, filter, sort

19   and display the link references 42, 52, and the link relationships 45. The server 30 may

20   comprise a server computer or other digital information device running software enabling

21   the present invention to store, index, search, filter, sort and transmit the link references

22   42, 52, and the link relationships 45 to client devices 20 . The server 30 further comprises

23   one or more link directories 35 for storing and indexing information regarding the link

24   relationships 45 and link references 42 and 52 developed by the client devices 20 with

25   respect to the one or more first documents 40 and second documents 50.

26   The link reference 42, 52 comprises a pointer to one document object 40, 50 on

27   the network 10 and attributes associated with that document object 40, 50. The link

28   relationship 45 comprises two pointers, one each to the first document object 40 and to

29   the second document object 50, and attributes describing characteristics of the

30   relationship between the two document objects 40, 50 related by the link relationship 45.

31   The pointers included in a link relationship 45 may be comprised of pointers to a link

32   reference 42, 52. The link relationship 45 establishes a meaningful relationship between

33   two document objects 40, 50, whereas the locations of the document objects 40, 50 may

34   be maintained within the Linkspace system 100 by means of the link references 42, 52.

1   The system 100 shown in figure 1 operates to create and store link relationships
2   45. The system 100 creates and stores link relationships 45 between a first document
3   object 40 and a second document object 50, preferably on one or more servers 30 in one
4   or more link directories 35 in the manner described as follows. The client device 20 is
5   enabled by means of software or other devices to request, access and display document
6   objects on the network 10. When the user of a client device 20 identifies one first
7   document object 40 of interest to her that she wishes to associate with a second document
8   object 50, she utilizes the software running on the Linkspace-enabled client device 20 to
9   create a link relationship 45 between the first document object 40 and the second
10   document object 50. This link relationship 45 is then stored on the server 30 in a link
11   directory 35.
12   In an alternate embodiment, the system 100 may operate to perform the functions
13   described above, including the creation of link relationships 45 and link references 42, 52,
14   the storing of link relationships 45 and link references 42, 52, and providing access to and
15   retrieval of link relationships 45 and link references 42, 52, by means of automated
16   procedures requiring little or no user interaction.
17   When a client device 20 later requests and accesses a first document object 40 for
18   which the server 30 has stored an associated link relationship 45 in one or more link
19   directories 35, the server 30 delivers to the client device 20 the link references 42 and the
20   link relationships 45, along with contextual information, or attributes, associated with the
21   link references 42 and the link relationships 45. The client device 20 then displays to the
22   user of the client device 20 the existence of a link relationship 45 between the first
23   document object 40 being accessed by the client device 20 and the second document
24   object 50. This enables the user of the client device 20 to be made aware of the second
25   document object 50, the context of the second document object 50, and the context of the
26   relationship between the second document object 50 and the first document object 40 as
27   that relationship may be of interest to the user of the client device 20 while viewing the
28   first document object 40.
29   Each link relationship 45 may also operate in the reverse direction. In this
30   manner, when a user of the client device 20 is accessing the second document object 50
31   for which an associated link relationship 45 is stored in the one or more link directories
32   35 on the server 30, the server 30 then transmits the link references 42 and the link
33   relationships 45, with contextual information, to the client device 20. This enables
34   display of the availability of the related first document object 40 to the user of the client

1   device 20 with the context of the first document object 40, and within the context of its

2   relationship to the displayed second document object 50.

3   While the system 100 is generally described as having enabling software resident

4   on the client device 20 and on the server 30, various other software configurations are

5   possible, including having all of the software resident at either the server 30 (making the

6   client device 20 essentially a "dumb terminal") or at the client device 20 (making the

7   client device 20 essentially perform server functions), or various software sharing

8   arrangements. For example, the client device 20 may include the one or more link

9   directories 35, a communications module (described later in reference to Figure 3a), and a

10   user data store that may maintain information regarding authorized users of the client

11   device 20 (described later in reference to Figures 2, 3a, and 3b).

12   Figure 2 is a diagram showing an example of the components of a Linkspace-

13   enabled client device 20 and its interaction with other software and hardware. The client

14   device 20 preferably includes a rendering tool 210, such as a web page browser like

15   Microsoft® Internet Explorer, for rendering document objects located on the network 10

16   and displaying those document objects to users of the client device 20; a client tool 220,

17   for allowing the user of the client device 20 to create and access link relationships 45

18   between document objects; and a network access tool 240, such as a TCP/IP stack or

19   other interface, for allowing software modules on the client device 20 to connect to and

20   communicate with other devices and document objects on the network 10. The client

21   device 20 operates primarily to create and present link relationships 45 to users.

22   The rendering tool 210 may store a document object URL address 215 for

23   referring to the document object currently being accessed and rendered by the rendering

24   tool 210. The rendering tool 210 may also include a Graphic User Interface ("GUI")

25   display 218, or other type of display, for displaying the document objects accessed and

26   rendered by the rendering tool 210. In alternate embodiments of the invention, the client

27   device 20 may include more than one rendering tool 210 enabling the user of the client

28   device 20 to access multiple document objects.

29   The client tool 220 may include a client GUI display 225, or other display

30   software and hardware, for displaying link references 42, 52 and link relationships 45 to

31   the user of the client device 20. Typically, the displayed link references 42, 52 and link

32   relationships 45 would be those link references 42, 52 and link relationships 45 relevant

33   to the document object currently being rendered and displayed by the rendering tool 210

1   (as determined by the document object URL address 215 in the rendering tool 210). The

2   client tool 220 may also include Linkspace user profile data 230 for storing information

3   about the user of the client device 20, the link directories 35 the user may have access to,

4   and the attributes of link references 42, 52, and attributes of link relationships 45 that the

5   user may be interested in. The Linkspace user profile data 230 may also or alternatively

6   be stored on the one or more servers 30, along with the Linkspace user profile data 230 of

7   all other users of the system 100.

8   An example of how the client device 20 operates to create and present link

9   relationships 45 to users of the client device 20 follows. While the network access tool

10   240 is active and placing the client device 20 in communication with the network 10, the

11   user enables the rendering tool 210 and the client tool 220. The user may then request

12   and access document objects stored on the network 10 by means of the rendering tool

13   210. Through the GUI display 218, the users enters or otherwise selects a document

14   object URL address 215 associated with the first document object 40 of interest to the

15   user. The client tool 220 connects to and uses the rendering tool 210 and accesses the

16   document object URL address 215 associated with the first document object 40. The

17   client tool 220 then establishes contact with the server 30 and passes to the server 30 the

18   stored document object URL address 215 associated with the first document object 40,

19   along with any relevant information that may come from the Linkspace user profile data

20   230. The connection to the server 30 may be initiated through the network access tool

21   240 or by other means not utilizing the network access tool 240.

22   The Linkspace-enabled server 30 searches the link directories 35 for any URLs in

23   the link references 42, 52 matching, or similar to, the document object URL address 215.

24   After searching, the server 30 retrieves the one or more link relationships 45 that include

25   the document object URL address 215. Prior to searching, the URLs may be stripped of

26   any information not relevant to the location of the document object 40, 50 on the network

27   10. Such information not relevant to the location of the document object 40, 50 may

28   include query strings or other data attached to URLs for tracking or other purposes.

29   The server 30 then determines the link references 42, 52 which may be of interest

30   to the user of the client device 20 by filtering the retrieved link references 42, 52 using the

31   Linkspace user profile data 230 and the attributes assigned to the link references 42, 52

32   and to the link relationships 45. The filtering of link references 42, 52 and link

33   relationships 45 may be accomplished by one of several methods of filtering data

34   including matching, character and Boolean comparing, and other data comparison and

1   filtering methods. The server 30 then transmits to the client tool 220 the filtered link

2   references 42, 52 included in the one or more link relationships 45. The client tool 220

3   presents the transmitted link references 42, 52 within the context established by the link

4   relationships 45 by means of the client GUI display 225.

5   To create a new link relationship 45, the user of the client device 20 must select a

6   first document object 40 to begin the link relationship, a second document object 50 to

7   complete the link relationship 45, and assign attributes to the link references 42, 52 and

8   the link relationship 45 between the two document objects 40, 50. To select a first

9   document object 40 to begin the new link relationship 45, the user interacts with the client

10   GUI display 225 to activate a function of the client tool 220 to capture the document

11   object URL address 215 associated with the first document object 40. To select a second

12   document object 50 to complete the new link relationship 45, the user may interact with

13   the GUI display 218 of the rendering tool 210 to request, access and display the second

14   document object 50. The user may then interact with the client GUI display 225 again to

15   activate a further function of the client tool 220 to capture the document object URL

16   address 215 associated with the second document object 50, completing the selection of

17   document objects 40, 50 participating in the new link relationship 45. Once the two

18   document objects 40, 50 are established, attributes of the link references 42, 52 and the

19   new link relationship 45 may be assigned.

20   The user may select or otherwise specify attributes associated with the link

21   references 42, 52 and link relationship 45. These attributes aid in categorizing, sorting or

22   filtering the link references 42, 52 and the link relationship 45 in the link directories 35

23   for delivery to other client devices 20. The attributes may be, for example, descriptive,

24   temporal, spatial, or quantitative in nature, i.e., describe the link reference in terms of who

25   or what, when, where, or how much. One such attribute (not shown) may be a plain

26   language name for the link reference 42, 52, determined and entered by the user to

27   describe the link reference in terms more useful to users of the system 100 than the

28   document object URL address 215. Other examples of attributes may include description

29   of the content of either of the document objects 40, 50 related by the link relationship 45,

30   wherein that content may be described to include a product review, news article, product

31   information page, competitor's product information, or product order forms, among other

32   types of content.

33   Normally, upon completion of the endpoint capturing and attribute assignment

34   functions, the client tool 220 connects to the server 30 to store the link references and the

1   new link relationship 45 in the appropriate link directory 35. Generally, the new link

2   relationship 45 is then made available to other users. Typically, other client devices 20

3   who have access to the server 30 and are assigned access privileges on the link directory

4   35 in which the new link relationship 45 has been stored are given access to the new link

5   relationship 45.

6   Furthermore, if the user of the client device 20 determines that there is a

7   relationship that is not already described by the transmitted link relationships 45 between

8   the currently accessed document object 40 and a second document object 50, the user

9   may proceed to create and publish a new link relationship 45 between the first document

10 object 40 (currently accessed and displayed by the rendering tool 210) and the second

11 document object 50. This may be accomplished without displaying the second document

12 object 50.

13   Figure 3a is a diagram showing the components of the Linkspace-enabled server

14 30 and its interaction with other hardware and software. The server 30 includes a first

15 link directory 35, a user data store 370, and a server manager 380. The server 30 may

16 also include a second link directory 310 and one or more Nth link directories 320. The

17 server manager 380 coordinates communications between the other components of the

18 server 30. The server manager 380 also coordinates communications with outside

19 objects, including the one or more client devices 20. The server manager 380 also

20 performs the function of locating appropriate link directories 35, 310, 320 for the user to

21 participate in based upon a document object presently displayed on the client device 20.

22 The user of the client device 20 may request that the server manager 380 look in all link

23 directories 35, 310, 320 across the system 100, regardless of whether the user has an

24 affiliation with the specific link directory 35, 310, 320 (which may be set in the user's

25 Linkspace user profile data 230), for the URL of the document object the user is currently

26 accessing with the client device 20. The user data store 370 stores identification and user

27 profile data regarding users authorized to access the server 30, which of the several link

28 directories 35, 310, and 320 those users are permitted access to, and which attribute

29 preferences the users have for each of the link directories 35, 310, 320. In alternate

30 embodiments of the invention, portions of the information maintained in the user data

31 store 370 may be stored in the link directories 35, 310, 320.

32   Figure 3a also shows one or more alternate Linkspace-enabled servers 350 that

33 may reside on the network 10. In alternate embodiments of the system of the invention,

34 the one or more alternate servers 350 may be located off the network 10 but otherwise

1   connected to or in communication with the client devices 20 and/or the first server 30.

2   One or more alternate link directories 360 may reside on the one or more alternate servers

3   350. The one or more alternate servers 350 may include other elements duplicating the

4   functions of the server manager 380 and user data store 370, as well as additional link

5   directories 310 and 320. The existence of the alternate servers 350 provides for flexibility

6   in the distribution of link directory data across several servers, redundancy and

7   interoperability across multiple networks and/or sets of client devices 20 and users of the

8   Linkspace system 100.

9   Each of the several link directories 35, 310, 320 or 360 may be associated with

10   and store link references 42, 52 and link relationships 45. These link references 42, 52

11   and link relationships 45 may have attributes matching categories defined by an

12   authorized user designated to manage such link directories 35, 310, 320 or 360. In this

13   manner, each link directory 35, 310, 320 or 360 may be considered to be a community of

14   interest. The authorized user designated to manage such link directories 35, 310, 320 or

15   360 may also establish attributes by which to organize, sort and filter the link references

16   and link relationships 45. Attributes may describe the types and properties of the

17   document objects 40, 50 and the link relationships 45. Any authorized user of the link

18   directories 35, 310, 320 or 360 may then create and place link references and link

19   relationships 45 in the link directories 35, 310, 320 or 360 and assign attributes to the link

20   references and link relationships 45.

21   Figure 3a further illustrates the provision for a further link relationship 345

22   between the second document object 50 and a third document object 340. The link

23   relationship 345 may be created by an authorized user of one of the client devices 20, just

24   as the link relationship 45 between the first document object 40 and the second document

25   object 50 was created. The link relationship 345 may be stored in a second link directory

26   310, separated from the link relationship 45 stored in the first link directory 35. As such,

27   the link relationships 45 and 345 may be considered to belong to differing communities of

28   interest represented by the separate first link directory 35 and second link directory 310.

29   A user of a client device 20 who is currently viewing or otherwise accessing the second

30   document object 50 will only be presented with the link relationship 345 if the user is an

31   authorized user of, and thus in the user directory 370 list for, the second link directory

32   310. Furthermore, a user of a client device 20 who is currently viewing or otherwise

33   accessing the second document object 50 will only be presented with both the link

34   relationship 45 and the link relationship 345 if the user is an authorized user of, and thus

1   in the user directory 370 lists for, both the first link directory 35 and the second link

2   directory 310. A user of the Linkspace system may be or may apply to be an authorized

3   user for any combination of or all of the link directories 35, 310, 320, and 360.

4   Figure 3b is a diagram showing more detail of one embodiment of the user data

5   store 370 from Figure 3a. The user data store 370 may include a user directory 372, a

6   user profile store 375, and a user account store 378.

7   The user directory 372 includes one or more user data records 374, typically one

8   or more each for every authorized user of the servers 30, 350. The user data records 374

9   may include personal identifying data for an associated authorized user and data

10   indicating the link directories 35, 31, 320, 360 to which each user has access.

11   The user profile store 375 includes one or more user profile records 330, typically

12   one or more each for every authorized user of the servers 30, 350. The user profile

13   records 330 for each authorized user may further include one or more user profiles 332.

14   Each user profile 332 may contain data regarding specific, differing

15   configurations of the user's personal, professional, geographic and other interests, and the

16   servers 30, link directories 35, 310, 320, 360, and attributes associated with those

17   interests, as entered by the user or collected by the client tool 220. The data in the user

18   profile 332 may be used to determine what link directories 35, 310, 320, 360 that the user

19   may have engaged. The data in the user profile 332 may further determine what attributes

20   of link references 42, 52, and of link relationships 45, will be considered by the server 30

21   in returning the link references 42, 52 and the link relationships 45 from the link

22   directories 35, 310, 320, 360 to the user's client device 20.

23   The user account store 378 includes one or more user account records 379, usually

24   one each for every authorized user of the servers 30, 350. The user account records 379

25   hold information regarding usage of the Linkspace system 100 by each authorized user.

26   The information in the user account records 379 may include data on instances of the

27   publication of link relationships 45, and the transmissions of link relationships 45 and

28   link references 42, 52 based upon the document object displayed by the client tool 220 of

29   each user. In alternate embodiments of the invention, data regarding the document

30   objects 40, 50, 340 requested and accessed by users of the system 100 is not recorded in

31   the user account records 379 against the individual authorized user in order to maintain

32   user privacy with regard to what document objects 40, 50, 340 each individual user may

33   request or access.

1   When an authorized user of a client device 20 creates a link relationship 45 that is

2   stored in one or more of the link directories 35, 310, 320, 360, the server manager 380

3   records in the user account record 379 (associated with the authorized user creating the

4   link relationship 45) the activity of creating and storing a link relationship 45. Each of

5   the authorized users of the link directories 35, 310, 320, 360 may be allowed to create

6   link relationships 45 to be stored in one or more of the link directories 35, 310, 320 or

7   360, to which that authorized user is permitted publication access. Each of the authorized

8   users of each specific link directory 35, 310, 320, 360 may also be allowed access for

9   display those link relationships 45 stored in the specific link directory 35, 310, 320,360

10   that relate to the first document object 40 or second document object 50 that the user is

11   currently viewing on the user's client device 20.

12   The interaction of each of the elements of the server 30, alternate server 350, the

13   client devices 20, and the first, second and third document objects 40, 50, and 340, along

14   with the creation and presentation of the link relationships 45 and 345 may be illustrated

15   by the application of the methods 600, 700, and 800 described below with reference to

16   Figs. 6, 7, and 8.

17   Figure 4a shows the general structure of one embodiment of the link directory 35.

18   This embodiment of the link directory 35 includes a link relationship table 420.

19   The link relationship table 420 comprises a list of link relationships 460, 470, 480,

20   490. These link relationships 460, 470, 480, 490 correspond to the link relationships 45,

21   345 created by users of the client device 20 as they are stored in the link directory 35.

22   The link relationship 460 comprises a field 462 containing a link reference 42 (L1)

23   including the URL address of the first document object 40 related by the link relationship

24   460; a field 463 containing a link reference 52 (L2) including the URL address of the

25   second document object 50 related by the link relationship 460; a set of link relationship

26   attributes 465; and a directional indicator 466 showing the nature of the link relationship

27   between the two document objects, either unidirectional or bi-directional. The link

28   relationship 460 is shown with the directional indicator 466 specifying that the link

29   relationship 460 is a unidirectional link relationship.

30   Some or all of the list of link relationships 460, 470, 480, 490 comprising the link

31   relationship table 420 may, in one embodiment of the invention, be stored on the server

32   30 in the form of relational database records. The relational database record

33   corresponding to the link relationship 460 may be comprised of one or more relational

34   database fields corresponding to the field (L1) 462, field (L2) 463, link relationship

1   attributes 465, and directional indicator 466. Each of the one or more relational database

2   fields may be formatted and designated to store various forms of relational database data

3   types. In one embodiment of the invention, the relational database field corresponding to

4   the field 462, as well as the relational database field corresponding to the field 463, may

5   contain data specifying the appropriate URL as text or other format appropriate for the

6   network upon which the invention may be implemented. In one embodiment of the

7   invention, the relational database field corresponding to the directional indicator 466 may

8   be formatted as a simple flag (i.e., Boolean) data type such as True/False, Yes/No, or

9   On/Off. Alternatively, the relational database field corresponding to the directional

10   indicator 466 may be formatted as a type to allow entry of a value indicating whether the

11   link relationship attribute 465 applies forward, backward or in both directions across the

12   link relationship 460. In one embodiment of the invention, the link relationship attributes

13   465 may be represented by one or more relational database fields. In this embodiment,

14   the relational database fields comprising the link relationship attributes 465 may include a

15   field of text data listing the assigned titles of the one or more specific link relationship

16   attributes assigned to the link relationship 460. The relational database fields comprising

17   the link relationship attributes 465 may then also include one or more attribute value

18   fields containing data formatted appropriately for the corresponding link relationship

19   attribute listed in the above described field of text data. For example, the plain language

20   name link relationship attribute may have its corresponding value stored in a field

21   formatted as text, whereas a zip code attribute may have its corresponding value stored in

22   a field formatted as a 5 or 9 digit integer, and a date attribute may have its corresponding

23   value stored in a field formatted in a date format. In an alternative embodiment, the

24   relational database fields comprising the link relationship attributes 465 may utilize

25   relational database key fields which point to additional database tables containing the

26   records specifying each available type of link relationship attribute for the link

27   relationship 460 and key fields which point to additional tables containing the values

28   associated with each of link relationship attribute identified by a key.

29   As with the link relationship 460, the link relationship 470 comprises a field 472

30   containing a link reference 42 (L1) including the URL address of the first document

31   object 40 related by the link relationship 470; a field 473 containing a third link reference

32   (L3) including the URL address of the third document object 340 related by the link

33   relationship 470; a set of link relationship attributes 475; and a directional indicator 476

34   showing the nature of the link relationship between the two document objects, either

1   unidirectional or bi-directional. The link relationship 470 is shown with the directional

2   indicator 476 specifying that the link relationship 470 is a bi-directional link relationship.

3   The link relationship 480 comprises a field 482 containing a link reference 52 (L2)

4   including the URL address of the second document object 50 related by the link

5   relationship 480; a field 483 containing the third link reference (L3) including the URL

6   address of the third document object 340 related by the link relationship 480; a set of link

7   relationship attributes 485; and a directional indicator 486 showing the nature of the link

8   relationship between the two document objects, either unidirectional or bi-directional.

9   The link relationship 480 is shown with the directional indicator 486 specifying that the

10   link relationship 480 is a bi-directional link relationship.

11   The link relationship 490 comprises a field 492 containing a link reference 52

12   (L2) including the URL address of the second document object 50 related by the link

13   relationship 490; a field 493 containing a link reference 42 (L1) including the URL

14   address of the first document object 40 related by the link relationship 490; a set of link

15   relationship attributes 495; and a directional indicator 496 showing the nature of the link

16   relationship between the two document objects, either unidirectional or bi-directional.

17   The link relationship 490 is shown with the directional indicator 496 specifying that the

18   link relationship 490 is a unidirectional link relationship.

19   The link relationship attributes 465, 475, 485, 495 may include a plain language

20   name (not shown) associated with each of the link references 42, 52 participating in the

21   respective link relationship 460, 470, 480, 490, as determined and entered by the user of

22   the client tool 220. The plain language name serves to describe the link reference 42, 52

23   in terms better understood by the users of the system 100 than the URL associated with

24   the link reference 42, 52. The link relationship attributes 465, 475, 485,495 serve to

25   describe the link references 42, 52 in terms useful to users of the system 100, and to place

26   the link references 42, 52 in a context that may attract users to select the link references

27   42, 52. Other examples of link relationship attributes 465, 475, 485, 495 may include

28   descriptions of the content of either of the document objects 40, 50 related by the link

29   relationship 460, 470, 480, 490, wherein that content may be described to include a

30   product review, news article, product information page, competitor's product information,

31   or product order forms, among other types of content.

32   The link relationship 470 may have a value assigned to the directional indicator

33   476 specifying that the link relationship 470 is a bi-directional link relationship. This

1 indicates that the link relationship attributes 475 apply to either of the two document

2 objects (40 and 340) equally in the context of the link relationship 470.

3 The link relationship 460 may, on the other hand, have a value assigned to the

4 direction indicator 466 specifying that the link relationship 460 is a unidirectional link

5 relationship. This signifies that the link relationship attributes 465 apply in only one

6 direction between the two document objects 40 and 50 represented in the fields 462 and

7 463 through the link references 42 and 52 respectively. In this instance, a link

8 relationship will not be transmitted and presented to the user of the client device 20 when

9 requested in the direction opposite to that specified by the direction indicator 466. In the

10 case of the link relationship 460 shown in Figure 4a, the attributes 465 apply only as the

11 link relationship 460 is traversed from the first link reference 42 to the second link

12 reference 52, and not in the reverse direction. In a similar manner, the link relationship

13 490 may have a value assigned to the direction indicator 496 specifying that the link

14 relationship 490 is a unidirectional link relationship. This signifies that the link

15 relationship attributes 495 apply in only one direction between the two document objects

16 50 and 40 represented in the fields 492 and 493 through the link references 52 and 42

17 respectively. In the case of the link relationship 490 shown in Figure 4a, the attributes

18 495 apply only as the link relationship 490 is traversed from the second link reference 52

19 to the first link reference 42, and not in the reverse direction. In this instance, a link

20 relationship will not be transmitted and presented to the user of the client device 20 when

21 requested in the direction opposite to that specified by the direction indicator 496.

22 In an alternate embodiment, the direction indicator 466 of the link relationship

23 460 may comprise a plurality of directional indicator fields (not shown). Each directional

24 indicator field may then correspond to one of the one or more link relationship attributes

25 465 and indicate whether the corresponding link relationship attribute 465 may apply in

26 one direction or in both directions between the two document objects 40 and 50

27 represented in the fields 462 and 463 through the link references 42 and 52 respectively.

28 Likewise, the direction indicator 496 of the link relationship 490 may comprise a plurality

29 of directional indicator fields (not shown). Each directional indicator field may then

30 correspond to one of the one or more link relationship attributes 495 and indicate whether

31 the corresponding link relationship attribute 495 may apply in one direction or in both

32 directions between the two document objects 50 and 40 represented in the fields 492 and

33 493 through the link references 52 and 42 respectively. In the alternate embodiment, a

1 similar arrangement may then be implemented for the remaining direction indicators 476,

2 486 of the link relationships 470, 480.

3 Figure 4b shows the general structure of another embodiment of the link directory

4 35. This embodiment of the link directory 35 includes a document object table 410, and a

5 link relationship table 420, as described above for Figure 4a.

6 The document object table 410 comprises a set of link references 430, 440, 450 to

7 document objects located on the network 10 to which the link directory 35 is connected.

8 Each link reference 430, 440, 450 further comprises the URL 432, 442, or 452 of the

9 respective document object 40, 50, 340 of interest; a set of document object attributes

10 435, 445, 455 associated with the URL 432, 442, 452; and a list 437, 447, 457 of pointers

11 to any of the link relationships 460, 470, 480, 490 by which the link references 430, 440,

12 450 may be connected to each other with context. In the case of a link relationship 460,

13 490 having the direction indicator 466, 496 set to indicate that the link relationship 460,

14 490 is unidirectional, the link relationship 460, 490 will be listed only in the list 437, 447,

15 457 of pointers for the link reference 430, 440, 450 that begins the unidirectional link

16 relationship 460, 490. The link references 430, 440, and 450 in Figure 4b correspond to

17 the link references 42, 52, and the third link reference (not shown), as described in

18 Figures 1-4a above, and which point to the URL addresses of the document objects 40,

19 50, and 340 respectively.

20 The document object attributes 435, 445, 455 serve to describe the link references

21 430, 440, 450 in terms useful to users of the system 100, and to place the link references

22 430, 440, 450 in a context that may attract users to select the link references 430, 440,

23 450. The document object attributes 435, 445, 455 may include a plain language name

24 that serves to describe the document object 40, 50, 340 in terms better understood by the

25 users of the system 100 than the URLs associated with the link references 430, 440, 450;

26 descriptions of the content of the document object 40, 50, 340 associated with link

27 references 430, 440, 450, wherein that content may be described to include a product

28 review, news article, product information page, competitor's product information, or

29 product order forms, among other types of content; and other descriptive characteristics

30 associated with the document object 40, 50, 340.

31 The link references 430, 440, and 450 may be created and placed in the document

32 object table 410 when a user of the client device 20 creates a link relationship 45 between

33 a first document object 40 and a second document object 50 or a third document object

34 340.

1   The link relationship table 420 shown in Figure 4b comprises the same list of link

2   relationships 460, 470, 480, 490, detailed above in Figure 4a. In Figure 4b, the link

3   relationship 460 comprises a field 462 containing a pointer to the link reference 430 for

4   the first document object 40 related by the link relationship 460; a field 463 containing a

5   pointer to the link reference 440 for the second document object 50 related by the link

6   relationship 460; the link relationship attributes 465; and the directional indicator 466. In

7   Figure 4b, the link relationship 470 comprises a field 472 containing a pointer to the link

8   reference 430 for the first document object 40 related by the link relationship 470; a field

9   473 containing a pointer to the link reference 450 for the third document object 340

10   related by the link relationship 470; the link relationship attributes 475; and the

11   directional indicator 476. In Figure 4b, link relationship 480 comprises a field 482

12   containing a pointer to the link reference 440 for the second document object 50 related

13   by the link relationship 480; a field 483 containing a pointer to the link reference 450 for

14   the third document object 340 related by the link relationship 480; the link relationship

15   attributes 485; and the directional indicator 486. Likewise, in Figure 4b, the link

16   relationship 490 comprises a field 492 containing a pointer to the link reference 440 for

17   the second document object 50 related by the link relationship 490; a field 493 containing

18   a pointer to the link reference 430 for the first document object 40 related by the link

19   relationship 490; the link relationship attributes 495; and the directional indicator 496.

20   Figure 5 illustrates one embodiment of the present invention in which the

21   invention may operate on multiple networks of varying degrees of network security. The

22   different networks on which the systems and methods of the present invention may be

23   implemented include a public network such as the Internet 510, a private network 520

24   that may be connected to the Internet 510, and a closed network 530 that is secure and not

25   accessible to users not connected to the closed network 530. The closed network 530 is

26   not connected to any public network such as the Internet 510, and is not connected to

27   another private network 520.

28   The public network or Internet 510 may have components connected to it that

29   implement the present invention, including one or more Linkspace-enabled client users

30   511, one or more link directories 512, one or more Linkspace-hosted content units 513,

31   and one or more networked content units 514. The link directories 512 described here are

32   functionally equivalent to the link directories 35, 310, 320, and 360 described above in

33   connection with Figures 1, 2 and 3a. The Linkspace-hosted content units 513 comprise

34   information storage devices connected to the network 510 that provide additional

1   document object storage facilities to users of the Linkspace system 100 separate from the

2   publicly or privately operated networked content units 514. The networked content units

3   514 may include networked data servers or web servers.

4   The Linkspace-hosted content units 513 are provided to accommodate the

5   streamlined publication and/or distribution of content by users of the Linkspace system

6   100. The client tool 220 may allow a user of the Linkspace system 100 to store document

7   objects of his or her own creation through a simplified procedure, i.e., a publish document

8   function enabled through the client GUI display 225. The user of the client device 20

9   may select a document object 40 that she wishes to publish through the Linkspace-hosted

10   content units 513, or she may create a document object (not shown) using the rendering

11   tool 210 or other document object creation tool. The user of the client device 20 then

12   selects the publish document function through the client GUI display 225 and selects the

13   link directories 35, 310, 320, 360 in which she wishes to create and publish new link

14   relationships 45, 345 referencing the user created or selected document object. The user

15   of the client device 20 may then create and publish link relationships 45, 345 referencing

16   the user created or selected document object. The client tool 220 may automatically

17   upload the user created or selected document object from the user's client device 20, or

18   from another location on the network, in this case the Internet 510, and save it on the

19   Linkspace-hosted content unit 513. The client tool 220 may then publish the new link

20   relationships 45, 345 referencing the user created or selected document object to the

21   appropriate link directory 35, 310, 320, 360, and then make the user created or selected

22   document object available to other users of the Linkspace system 100 through the new

23   link relationships 45, 345. The activity of publishing a user created or selected document

24   object in this manner is also recorded in the appropriate user account record 379 for the

25   user creating or selecting the document object to be published.

26   Similarly, the private network 520 may have connected to it components that

27   implement the present invention, including one or more Linkspace-enabled client users

28   521, one or more link directories 522, one or more Linkspace-hosted content units 523,

29   and one or more networked content units 524.

30   Additionally, the closed network 530 may have connected to it components that

31   implement the present invention, including one or more Linkspace-enabled client users

32   531, one or more link directories 532, one or more Linkspace-hosted content units 533,

33   and one or more networked content units 534.

1   In Figure 5, the private network 520 is shown connected to the public network or

2   Internet 510. This may allow Linkspace-enabled client users 521 connected to the private

3   network 520 to also be permitted access to any of the one or more link directories 512,

4   Linkspace-hosted content units 513, and networked content units 514 that are connected

5   to the public network or Internet 510. However, Linkspace-enabled client users 511

6   connected to the public network or Internet 510 that are not also among the group of

7   authorized Linkspace-enabled client users 521 of the private network 520, may not be

8   permitted to access the one or more link directories 522, Linkspace-hosted content units

9   523, and networked content units 524 that are connected to the private network 520.

10   A Linkspace client user 531 connected to the closed network 530, and therefore

11   not connected to either the public network or Internet 510 nor to the private network 520,

12   may only be permitted access to the one or more link directories 532, Linkspace-hosted

13   content units 533, and networked content units 534 that are connected to the closed

14   network 530.

15   Figure 6 is a flowchart showing the steps of a method 600 according to one

16   embodiment of the present invention. The method 600 includes the steps of a first user

17   (not shown) of a client device 20 locating a first document object 40 (step 610); the first

18   user locating a second document object 50 (step 620); and the first user creating a link

19   relationship 45 between the first document object 40 and the second document object 50

20   (step 630). The method 600 includes the additional steps of storing the link relationship

21   45 created by the first user in a link directory 35 (step 640); and providing access to the

22   link directory 35 to a second user (not shown) of another client device 20 (step 650).

23   The method 600 may include a step for providing authorized users of client

24   devices 20 access to the link relationships 45 stored in link directories 35, based upon the

25   document object 40 currently accessed by the users on the users' client device 20 (step

26   660).

27   Figure 7 is a flowchart showing the steps of a method 700 for accessing and

28   displaying link relationships and related document objects on a network according to one

29   embodiment of the present invention. The method 700 initiates when a user of a client

30   device 20 engages the rendering tool 210 to request, access and display a document object

31   40 (step 710). The user of the client device 20 then engages the client tool 220 and is

32   authenticated by a server 30 (step 715). The user of the client device 20 then selects a

33   user profile 332 (step 717) that has been returned to the client device 20 upon

34   authentication of the user by the server 30 in step 715. The selected user profile 332 may

1   be used to determine what attributes of the link relationships 45 will be applied to filter

2   and sort the link references 430, 440, 450 and link relationships 460, 470, 480 returned by

3   the server 30. By filtering and sorting using attributes, a manageable and meaningful

4   group of relevant link references 430, 440, 450 may be displayed to the user based on the

5   user's needs and interests.

6   In alternate embodiments of the method 700, the steps 715 and 717 may occur

7   before the step 710.

8   With the user profile 332 selected and the document object 40 displayed, the user

9   then selects a client tool 220 function (step 720). The first function that the user may

10   select is to enter a document object URL 215 into the rendering tool 210, whereupon that

11   document object URL 215 is captured by the client tool 220 and transmitted to the servers

12   30 (step 730). The activity of transmitting the document object URL 215 to the servers

13   30 by the client tool 220 may be recorded and stored in an appropriate location within the

14   user data store 370.

15   The server 30 then processes the transmitted document object URL 215 across the

16   various link directories 35 to which the user is authorized access. One method of

17   processing by the server 30 is according to the following steps. The server 30 performs a

18   search of the document object tables 410 of all link directories 35 to find all instances of

19   the document object URL 215 (step 735). The server 30 then searches the Link

20   relationship tables 420 in the link directories 35 where the URL 215 was found. This

21   search by the server 30 locates all link relationships 460, 470, 480, 490 referencing the

22   URL 215 as one of the pointers to link references 462 or 463, 472 or 473, 482 or 483, 492

23   or 493 included in those link relationship 460, 470, 480, 490 (step 740). The server 30

24   then accumulates all the URLs 432, 442, 452 related, through the link relationships 460,

25   470, 480, 490 identified in step 740, to the URL 215. The server 30 also accumulates the

26   document object attributes 435, 445, 455 associated with the identified URLs 432, 442,

27   452 and the link relationship attributes 465, 475, 485, 495 associated with the link

28   relationships 460, 470, 480, 490 identified in step 740 (step 745).

29   The accumulated URLs 432, 442, 452 are then filtered by link relationship

30   attributes 465, 475, 485, 495 (step 750), and then filtered again by document object

31   attributes 435, 445, 455 (step 755). In alternate embodiments of the method 700, the

32   accumulated URLs 432, 442, 452 may be filtered first by document object attributes 435,

33   445, 455 (step 755) and then by link relationship attributes 465, 475, 485, 495 (step 750).

34   The user profile 332 is applied to determine what link relationship attributes 465, 475,

1   485, 495, and document object attributes 435, 445, 455 to use in filtering the accumulated

2   URLs 432, 442, 452. The filtered URLs 432, 442, 452 are then sent back to the client

3   device 20 that transmitted the URL 215, along with the associated document object

4   attributes 435, 445, 455, and associated link relationship attributes 465, 475, 485, 495

5   (step 760). The activity of transmitting the filtered URLs 432, 442, 452, along with the

6   associated document object attributes 435, 445, 455, and associated link relationship

7   attributes 465, 475, 485, 495, to the client device 20 may be recorded and stored in an

8   appropriate location within the user data store 370. Alternatively, the first filtering steps

9   750, 755 may be performed by the client device 20.

10   The client tool 220, upon receiving the filtered URLs 432, 442, 452 from the

11   server 30, may further filter and sort the returned URLs 432, 442, 452 according to data

12   stored in the selected user profile 332 (step 765). In this manner, the data in the user

13   profile 332 may be applied to the filtered and sorted URLs 432, 442, 452 on either the

14   server 30 or the client tool 20.

15   The filtered and sorted URLs 432, 442, 452 are then displayed to the user of the

16   client device 20 by the client GUI display 225 and the client tool 220 alerts the user of the

17   client device 20 to the availability of related links (in the form of the returned URLs 432,

18   442, 452) by means of an indicator in the client GUI display 225 (step 770). The method

19   700 then returns to step 720 to await further action by the user of the client device 20.

20   If, at step 720, the user of the client device 20 selects one of the URL links 432,

21   442, 452 displayed by the Linkspace GUI display as being related by link relationships

22   460, 470, 480, 490 to the presently accessed document object 40 with the URL 215 (step

23   780), the rendering tool 210 then accesses the new document object 50 associated with

24   the selected URL and displays that document object 50 in the GUI display 218 of the

25   rendering tool 210 (step 785). The new document object URL address 215 of the selected

26   document object 50 is then passed on to the servers 30 (step 790) and the method 700

27   continues with step 735, as above, using the URL 215 of the new document object 50 as

28   the URL to search for.

29   Figure 8 is a flowchart showing the steps of a method 800 for creating and

30   publishing link relationships according to one embodiment of the present invention. The

31   method 800 initiates when a user of the client device 20 engages the client tool 220 and is

32   authenticated by a server 30 (step 810). The user of the client device 20 may then select a

33   publish link relationship function of the client tool 220 (step 815).

1   The user of the client device 20 may then navigate, using the rendering tool 210,

2   to the first document object 40 of the new link relationship 45 that the user of the client

3   device 20 wishes to create and publish. The user may then select a declare first link

4   function of the client tool 220 (step 820). The user of the client device 20 may then

5   navigate, again using the rendering tool 210, to the second document object 50 that the

6   user of the client device 20 wishes to associate by means of a link relationship 45 with the

7   first document object 40. The user can then select the declare second link function of the

8   client tool 220 (step 825). The user of the client device 20 has now selected both ends of

9   a link relationship 45.

10   The user now may select which of the link directories 35 in which the user wishes

11   to publish the new link relationship 45 (step 830). The user of the client device 20 may

12   then further assign link relationship attributes, such as those shown in figure 4 (465, 475,

13   485, 495) to the link relationship 45, along with assigning any document object attributes,

14   such as those shown in figure 4 (435, 445, 455), to the first document object 40 and

15   second document object 50 of the link relationship 45 (step 835). The user may then

16   interact with a Linkspace GUI 225 button or element to complete the link relationship

17   publish function (step 840). Upon completion of the link relationship publish function on

18   the client device, the URLs and document object attributes of the document objects 40

19   and 50 associated by the new link relationship 45 are stored in the document object table

20   410 in the selected link directory 35 (step 850). Additionally, the new link relationship

21   45, along with the URL references to the first document object 40 and second document

22   object 50 and the link relationship attributes, such as those shown in figure 4 (465, 475,

23   485, 495), are stored in the link relationship table 420 in the selected link directory 35

24   (step 855). The method 800 for creating and publishing link relationships completes by

25   recording the publishing activity to the user account record 379 associated with the user

26   of the client device 20 for later tracking and billing purposes (step 880).

27   Figure 9 is an example of a user interface, more specifically, a screen view of a

28   user interface for a relate links dialog box 900, one element of the user interface of one

29   embodiment of the invention. The relate links dialog box 900 is invoked when a user of

30   the client tool 220 engages the publish link relationship function of the client tool 220. In

31   the embodiment shown in Figure 9, the relate links dialog box 900 includes a drop down

32   list 910 for selecting a community of interest, a user interface term referring to one of the

33   one or more link directories 35, and a checkbox 915 for indicating whether the link

34   relationship 45 being created is to operate bi-directionally or unidirectionally. If the

1   checkbox 915 is checked, then the link relationship 45 being created will only apply in

2   one direction. In the example illustrated in Figure 9, the user has selected the community

3   of interest (link directory 35) referred to as "Wireless Washington," a link directory 35

4   storing link references 42, 52 and link relationships 45 considered by their creators as

5   relevant to wireless device users in the Washington, DC metropolitan area.

6   The relate links dialog box 900 further includes a link-from section 920, a link-to

7   section 930, a link relationship attributes display box 970, a submit link relationship

8   button 980 and a cancel button 985. The submit link relationship button 980 is selected

9   by the user when the user has selected and/or entered all information associated with the

10   link references 42, 52 and the link relationship 45 that the user wishes to publish. Upon

11   selection of the submit link relationship button 980, the client tool 220 closes the relate

12   links dialog box 900 and transmits the information associated with the created link

13   relationship 45 to one of the one or more servers 30. The cancel button 985 may be

14   selected by the user to abort the creation and publication of the link relationship 45 that

15   the user initiated and to close the relate links dialog box 900.

16   In the embodiment shown in Figure 9, the link-from section 920 may include a

17   first document object URL 922 associated with the first document object 40 included in

18   the link relationship 45 being created, where the first document object URL 922 was

19   captured when the publish link relationship function was engaged; a first plain language

20   name field 925; and a listing of first link reference attributes 940 and the attribute values

21   942 associated with those first link reference attributes 940. In the example illustrated by

22   Figure 9, the first document object URL 922 is the address of a first document object 40

23   that is a web page for a coffee and dessert shop. The first plain language name field 925

24   may be captured when the publish link relationship function was engaged and/or may be

25   edited by the user creating the link relationship 45. An exemplary first link reference

26   attribute for food 945, and the value of specialty foods 947 assigned to the first link

27   reference attribute 945 by the user creating the link relationship 45, are also shown.

28   The link-to section 930 similarly may include a second document object URL 932

29   associated with the second document object 50 included in the link relationship 45 being

30   created, where the second document object URL 932 was captured when the publish link

31   relationship function was engaged; a second plain language name field 935; and a listing

32   of second link reference attributes 950 and the attribute values 952 associated with those

33   second link reference attributes 950. In the example illustrated by Figure 9, the second

34   document object URL 932 is the address of a second document object 40 that is a web

1   page for a "LinkSpace Restaurant" located in McLean, Virginia (a suburb of

2   Washington). The second plain language name field 935 may be captured when the

3   publish link relationship function was engaged and/or may be edited by the user creating

4   the link relationship 45. An exemplary second link reference attribute for location 955,

5   and the value of address 995 assigned to the second link reference attribute 955 by the

6   user creating the link relationship 45, are also shown. In addition, in the example

7   illustrated by Figure 9, a subordinate attribute for city 957, subordinate under the attribute

8   for location 955, and a value of address 995 along with the assigned value of McLean 958

9   for the subordinate attribute for city 957, are also shown in the link-to section 930.

10 Further subordinate attributes may include a street 956 with a value 959 of 12345 Main

11 Street.

12   The link relationship attributes display box 970, as shown for the embodiment

13 illustrated by Figure 9, includes a list of link relationship attributes 972 and a delete link

14 relationship attribute button 975. The link relationships 972 are formed by pairs of first

15 link reference attributes 940 and second link reference attributes 950 that the user creating

16 the link relationship 45 has selected to describe the nature of the link relationship 45.

17 These link relationship attributes 972 may form the link relationship attributes 465, 475,

18 485, 495 described in Figure 4a. The delete link relationship attribute button 975 may be

19 used to delete a selected link relationship attribute 972 displayed in the link relationship

20 attributes display box 970.

21   The exemplary link relationship attribute 972 shown in Figure 9 indicates that the

22 user creating the link relationship 45 has declared that the city subordinate attribute 957

23 (one selected second link reference attribute 950) of the Linkspace Restaurant associated

24 with the second document object 50, having a value of McLean 958, is related to the food

25 attribute 945 (one selected first link reference attribute 940), having a value of specialty

26 foods 947, of the coffee shop associated with the first document object 40. As a result,

27 once the exemplary link relationship 45 shown in Figure 9 is created and published, other

28 users of Linkspace-enabled client devices 20 that request and/or access the Linkspace

29 Restaurant web page may be presented with a link reference 42, 52 pointing to the web

30 page for the coffee and dessert shop, as illustrated in the link reference display window

31 1020 shown in Figure 10.

32   In one embodiment of the invention, the link relationship attribute 972 may be

33 declared by the user performing a drag-and-drop operation wherein the link reference

34 attribute 957 is dragged and dropped onto the link reference attribute 945, creating the

1　link relationship attribute 972 which relates the two document objects 40, 50 by the

2　association of the city subordinate attribute 957 to the food attribute 945. In an alternate

3　embodiment, the creation and selection of link relationship attributes 972 may be

4　performed in a manner similar to that used in the link-to section 930 and link-from

5　section 920 described above, utilizing a set of link relationship attribute types along with

6　data input fields for entering or otherwise selecting values for those attributes.

7　　　Figure 10 is an example of a screen view for one embodiment of the client GUI

8　display 225 for one embodiment of the invention, wherein the client GUI display 225 is

9　integrated into the GUI display 218 of the rendering tool 210. In the embodiment shown

10　in figure 10, a client toolbar 1010 and a link reference display window 1020 together

11　comprise the client GUI display 225. A browser window 1030 displays the document

12　object (40, 50) being requested and accessed by the rendering tool 210 and having the

13　document object URL address 215 displayed in an address bar field 1040.

14　　　The client toolbar 1010 includes a number of GUI buttons that initiate various

15　functions of the client tool 220. A client logon button 1050 initiates a connection

16　between the client tool 220 and one or more servers 30. A client logoff button 1055 ends

17　a user session for the client tool 220 and disconnects the client tool 220 from the one or

18　more servers 30. A mark starting page button 1060 may be engaged to initiate the publish

19　link relationship function of the client tool 220 by setting the currently displayed

20　document object 40 shown in the browser window 1030 and referenced by the document

21　object URL address 215 displayed in the address bar field 1040 as the first document

22　object 40 in the link relationship 45. After the user navigates to a second document

23　object 50, a mark ending page button 1065 may be engaged to complete the selection of

24　participating document objects 40, 50 for the publish link relationship function of the

25　client tool 220. Engaging the mark ending page button 1065 sets the newly displayed

26　document object 50 shown in the browser window 1030 and referenced by the document

27　object URL address 215 displayed in the address bar field 1040 as the second document

28　object 50 in the link relationship 45, and opens a relate links dialogue box 900 (shown

29　and described in Figure 9 above) to allow the user of the client tool 220 to assign

30　attributes to the link relationship 45.

31　　　The client toolbar 1010 also may include three icons that indicate the availability

32　and type of link references 42, 52 related to the document object 40 open in the browser

33　window 1030. These icons may include a publisher links indicator 1071, a private links

34　indicator 1072, and a community links indicator 1073.

1   The link reference display window 1020 presents the user with a hierarchical

2   listing of any link references 42, 52, delivered by the server 30, that may be related to the

3   document object 40 that is currently displayed in the browser window 1030 and has the

4   document object URL address 215 shown in the address bar field 1040. The link

5   reference display window 1020 may be presented in a tabbed format, wherein each tab

6   may contain a different set of link references 42, 52 depending on the type of link

7   reference and link relationship involved. In one embodiment of the invention, there may

8   be three different tabs at the top of the link reference display window 1020, each

9   corresponding to one of the indicator icons (1071, 1072, 1073) in the client toolbar 1010.

10   The first tab may be a private links tab 1074, corresponding to the private links indicator

11   1072. The second tab may be a publisher links tab 1075, corresponding to the publisher

12   links indicator 1071. The third tab may be a community links tab 1076, corresponding to

13   the community links indicator 1073.

14   The document object 40 displayed in the browser window 1030 in Figure 10 is a

15   representative web page, in this case for a restaurant named Linkspace. When this page is

16   displayed, and the client tool 220 is engaged, as indicated by the recessed display of the

17   client logon button 1050 in the client toolbar 1010, one or more of the indicator icons

18   (1071, 1072, 1073) in the client toolbar 1010 will become highlighted if there are any link

19   references 42, 52 available of the corresponding type.

20   For example, as illustrated in Figure 10, the community links indicator 1073 is

21   highlighted, while the publisher links indicator 1071 and the private links indicator 1072

22   are grayed out. This indicates that the server 30 has returned one or more link references

23   42, 52 that are categorized as community links and has not returned any link references

24   42, 52 categorized as publisher or private links. The returned link references 42, 52 are

25   displayed in the link reference display window 1020 under the community links tab 1076.

26   In this case, the link references 42, 52 are displayed in a hierarchical listing under affinity

27   directory headings 1081, 1082. The affinity directory heading 1082 shown represents one

28   community of interest, corresponding to one link directory 35 on a server 30, maintaining

29   one set of link relationships 45 and link references 42, 52, that may include the document

30   object 40 displayed in the browser window 1030. In addition, under each affinity

31   directory heading 1081, 1082, there may be displayed one or more attribute folders 1091,

32   1092. Each attribute folder 1091, 1092 may contain a grouping of listed hyperlinks 1095,

33   1096 drawn from the respective affinity directory heading 1082 and related to the

1 document object 40 displayed in the browser window 1030 by a particular link

2 relationship attribute 972.

3   In the example shown in Figure 10, affinity directory heading 1082 indicates a

4 link directory 35 focusing on wireless devices in the Washington, DC area. Also shown

5 in the example in Figure 10, the attribute folder 1091 groups listed hyperlinks 1095 by the

6 link relationship attribute 972, further relating document objects 40 to specialty food

7 document objects 50. The listed hyperlink 1095, listed under the attribute folder 1091,

8 comprises the text of the plain language name attribute of a document object concerning

9 coffee and dessert after dinner. In this manner, the listed hyperlink 1095, displayed under

10 the affinity directory heading 1082 and the attribute folder 1091, represents a link

11 reference 52 to a document object 50 that is related, as a document object of interest to

12 wireless device users in the Washington area, and as a specialty food document object, to

13 the document object 40, the restaurant web page, displayed in the browser window 1030.

14   The attribute folder 1092 shown in the example in Figure 10 groups listed

15 hyperlinks 1096 by the link relationship attribute 972 further relating documents objects

16 40 to document objects 50 concerning the downtown area of the Washington, DC suburb

17 of McLean. The listed hyperlink 1096 is to a LinkNexus document object for the city of

18 McLean. A LinkNexus document object may comprise a listing of further link references

19 42, 52 to document objects 40, 50 relating to a particular subject. In the case illustrated in

20 Figure 10, the LinkNexus document object indicated by the listed hyperlink 1096 may

21 contain link references 42, 52 concerning the suburban city of McLean. In this manner,

22 the listed hyperlink 1096, displayed under the affinity directory heading 1082 and the

23 attribute folder 1092, represents a link reference 52 to a document object 50 that is

24 related, as a document object of interest to wireless device users in the Washington area,

25 and as a link to content relevant to downtown McLean, to the document object 40, the

26 restaurant web page, displayed in the browser window 1030.

27   The affinity directory heading 1081 shown in the example in Figure 10 indicates a

28 community related to "Your Company," the user's company. This affinity directory

29 heading 1081 may contain link references 42, 52 to document objects 40, 50 maintained

30 on the user's company's private network 520, accessible to users within the company, but

31 not to the general public, as shown and described in Figure 5.

32   The steps of the methods 600, 700 and 800, and subsets of those steps or parts of

33 the methods, may be implemented with hardware or by execution of programs, modules

34 or scripts. The programs, modules or scripts may be stored or embodied on one or more

1   computer readable mediums in a variety of formats, including source code, object code or

2   executable code, among other formats. The computer readable mediums may include, for

3   example, both storage devices and signals. Exemplary computer readable storage devices

4   include conventional computer system RAM (random access memory), ROM (read only

5   memory), EPROM (erasable, programmable ROM), EEPROM (electrically erasable,

6   programmable ROM), and magnetic or optical disks or tapes. Exemplary computer

7   readable signals, whether modulated using a carrier or not, are signals that a computer

8   system hosting or running the described methods can be configured to access, including

9   signals downloaded through the Internet or other networks.

10   The terms and descriptions used herein are set forth by way of illustration only

11   and are not meant as limitations. Those skilled in the art will recognize that many

12   variations are possible within the spirit and scope of the invention as defined in the

13   following claims, and their equivalents, in which all terms are to be understood in their

14   broadest possible sense unless otherwise indicated.